physics and chemistry in the remaining part of the book. Electricity is dealt with in sixteen pages of this part, and chemistry in twenty-eight pages. Most of the illustrations are line drawings, and will not be attractive to the young people for whom the book is intended; for few natural history objects can be well represented by outline sketches, and children often have a difficulty in understanding them.

In the preface the editor, referring to the object of the book, suggests that it should be especially useful in "the junior classes in schools." But few teachers who have had experience in giving instruction to such classes would approve of the order in which some of the subjects are dealt with. For instance, the first chapter deals with the difficult subject of classification of animals, and leaving out of account the fact that the scheme of classification described is somewhat old-fashioned, we think it pedagogically wrong to begin the study of natural history by classifying the animal kingdom. Teachers may, however, find the volume useful in providing information for lessons on natural history objects, and suggesting experiments in physics and chemistry.

Notes from a Diary in Asiatic Turkey. By Lord Warkworth, M.P. Pp. xvi + 268. (London: Edward Arnold, 1898.)

THE author of this book, now Earl Percy, travelled by several of the main routes and some unfrequented ways of Asiatic Turkey in 1897. He shows himself to be a wide-awake politician, an instructed antiquarian, and something of a sportsman; hence the narrative necessarily deals with matters from a point of view somewhat remote from the scientific. The book is charmingly got up, gracefully written, and illustrated by some choice reproductions of good photographs, one of which represents a dervish with a dagger thrust through both cheeks and apparently insensible to pain. Throughout the journey, indeed, there seems to have been very little objection on the part of the people to allow themselves and their belongings to be photographed, a result doubtless of the infiltration of Western ideas even into the remoter parts of the Turkish empire. Incidentally, one or two points of scientific interest are touched upon. The strange idea is noted that the honey of a district near Erzerum is not only poisonous when taken in large quantities, but that if the red water-melon is eaten at the same meal with some of the honey, death would result from the formation of large crystals in the stomach. A curious statement is made as to the extent of the occasional inundations of Lake Van, one of the natives declaring that the water had recently risen as much as 400 feet, a degree of flood which the author prudently views as an exaggeration. The discovery of a spring "bubbling over with a copious flow of liquid sulphur" (p. 204) would certainly be interesting, but it probably was no more than water impregnated with sulphuretted hydrogen.

As an intelligent, modest, and serious account of an interesting journey in a country still difficult of access, this book deserves very hearty commendation, and it would be gratifying to believe that all members of Parliament could make so good a use of their holidays as Lord Percy has done.

Lectures on Theoretical and Physical Chemistry. By J. H. van 't Hoff. Translated by R. A. Lehfeldt. Part I. Chemical Dynamics. Pp. 254. (London: Edward Arnold.)

TO what has already been said regarding the French edition of this excellent work (NATURE, p. 458) there is little to add. The translation is accurate, the few slips that occur being mostly referable to the original, and easy of detection. As to paper and printing the book leaves nothing to be desired, although perhaps this result has been attained at the expense of a wider popularity which the book might have enjoyed had its price been lower.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. *No notice is taken of anonymous communications.*]

Experiment to Illustrate the Zeeman Effect.

PROF. A. GRAY has kindly called my attention to his Royal Institution lecture of April 29, 1898, in which, nearly a year ago, he pointed out the analogy between a pendulum with a gyrostat in its bob, and the molecule of a gas vibrating in a magnetic field, which I called attention to in my recent letter (p. 509). GEO. FRAS. FITZGERALD.

Trinity College, Dublin, April 5.

Formation of Egg-capsules in Gasteropoda.

THE function of the sole-gland of the foot in certain divisions of the Gasteropoda seems hitherto to have remained unknown. None of the works I have been able to consult give a definite account of the function of the organ. This sole-gland appears from the literature to exist only in the dioecious Azygobranchia, whereas the more anterior marginal gland of the foot is found both in these and in Pulmenata and Opisthobranchia.

On the other hand, I have been unable to find any published account of the origin and formation of the horny capsules, in which the ova of most Azygobranchia are deposited and contained during their development. Many writers seem to assume that these capsules are formed in the generative duct, which is not the case.

I have recently satisfied myself that these two gaps in our knowledge of the Mollusca are really one; in other words, that the egg-capsules are formed by the sole-gland, and that the latter is really the nidamental gland. I first discovered this in the common whelk *Buccinum undatum*, which I found in numbers in the act of spawning on the shores of Falmouth Harbour in November 1897. Pulling away the animals from the stones to which they adhered, I found incompletely formed capsules in the cavity of the sole-gland, and saw that the "spawn" was formed and deposited by the "foot." The ova are probably transferred to the cavity of the gland, before the closure and deposition of the capsule. I have recently verified the same fact in the same locality in another species, namely *Murex erinaceus*. In this case the capsule is long and narrow in shape, and I saw it in an imperfectly matured though fully formed condition, drawn out of the aperture of the sole-gland, when I detached a specimen in the act of spawning.

Lacaze Duthiers has shown that the float of *Janthina* is formed by a glandular depression of the foot corresponding to the sole-gland, and Johannes Thiele maintains that the egg-capsules of this animal, attached to the float, are produced also by a certain portion of this gland. Simroth, however, believes with Lacaze Duthiers that the "cocoons" or capsules are derived from the sexual organs. I have no doubt Thiele is right, but he does not appear to have extended his doctrine to other forms than *Janthina*.

The function of the sole-gland being thus established, the question arises whether there is not a difference in the structure or size of the gland between the male and female, since the male does not produce egg-capsules. This and other questions I must leave to be investigated in future. Not knowing when I may have leisure to make a more detailed study of the subject, I wish to make known the main fact, which can be easily verified by the observation of living Prosobranchs in the act of spawning. J. T. CUNNINGHAM.

1 Morrab Terrace, Penzance.

The Natural Prey of the Lion.

WHAT constitutes the natural prey of the lion in his wild state is, I believe, a disputed point. The majority of people, probably, are of opinion that he is extremely fastidious in his tastes; others, again, assert that he will eat almost anything. Certainly, it is only reasonable to suppose that a lion sufficiently under the impulse of hunger will eat "almost anything"!

Years ago I was present on more than one occasion when animated discussions on this point took place between two notable African ecclesiastics—both since dead—Bishop Smythies

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and Archdeacon Maples (he was then), both of whom had travelled a good deal in Africa—Maples more especially—and had seen something of the habits of lions.

Bishop Smythies defended the former theory; Archdeacon Maples—a most talented and entertaining man—the latter, saying he had known instances of lions killing porcupines, and adding that he believed the porcupine to be specially endowed with the power to propel his quills into his assailant when so attacked.

At this juncture, Bishop Smythies generally lost patience and declined to continue the argument.

Had Bishop Smythies lived, it would have interested him, as it may interest some of NATURE's readers, to know that in March last, at the Salt Stream, two days' march N.W. of Kibwezi, I shot a fine old lion in whose left fore-paw were deeply buried the tips of three porcupine quills.

These are in my possession at the present time: the longest measures exactly 1 inch; another is almost as long, and measures $\frac{15}{16}$ of an inch. How long he had been afflicted with these painful appendages I could not say—months at any rate, or may be years; since the paw was not inflamed, and from constant friction and pressure in using it the cartilage surrounding the quills had become callous.

There is no immediate reason for supposing that in this case the lion killed the porcupine acting on the impulse of inordinate hunger: the Salt Stream country teems with game—such as rhinoceros, zebra, hartebeeste, gnu, gazelles, and ostriches; it is also just such a country for cover as lions habitually frequent, and *do* frequent in numbers, as may be judged from the fact that in two days I saw them on three occasions.

Leopards, I was already aware, prey freely on porcupines. But this is the first instance which has occurred—in my own experience—of a lion's doing so. RICHARD CRAWSHAY.

Neugia, Kitwi, British East Africa, February 6.

Precipitation of Gold by Charcoal.

IN your "Notes" this week, the use of charcoal as a precipitant for gold from solutions is mentioned as being pretty largely applied in Australia, and that the cause of precipitation is not understood.

I venture to put it this way: that by some process, accelerated no doubt by surrounding physical changes, there is formed within the charcoal carbon *mon*oxide (and also carbon dioxide), which is a precipitant for gold. The difficulty of ridding charcoal of oxygen without chemical combination is well known.

I may mention that I am now using carbon monoxide as an industrial precipitating agent in gold-winning.

JAMES C. RICHARDSON.

19 Claremont Square, London, March 29.

IT is an old idea that carbon monoxide is the real agent in the precipitation of gold from solutions of the chloride by means of charcoal. An objection to Mr. Richardson's suggestion, that the same view may be taken in the case of cyanide solutions, lies in the fact that, according to my own experiments, carbon monoxide does not appear to precipitate gold under ordinary conditions from these solutions.

The main objection, however, to all the theories put forward to account for the precipitation of gold by charcoal is that they are not supported by the results of any published experiments.

THE WRITER OF THE NOTE.

Instincts of Wasps.

PERHAPS it may interest your reviewer of Dr. and Mrs. Peckham's work "On the Instincts and Habits of the Solitary Wasps," to learn that one of the main results in question has been already arrived at in a paper by the late Prof. Schiff, of Geneva, in *Mémoires de la Soc. de Physique et d'Histoire naturelle de Genève*, vol. xxviii., 1882-3. I quote the following passage, as in some way complementary to the observations of Dr. Peckham:

"D'ailleurs, un examen microscopique approfondi du système, nerveux des animaux intoxiqués par les guèpes n'a pas revélé la moindre lésion dans les nerfs et les ganglions de ces animaux."

Freiburg, Badenia, March 18. DAVID WETTERHAN.

CORUNDUM AND ITS USES.[1]

THE three works cited below give much new and valuable information concerning the mode of occurrence, the processes of mining, and the uses of corundum. As the mineral is of growing economic value, and is every day finding fresh applications in the arts, it seems desirable to call attention to some of the facts which are for the first time made accessible to the public in these works. We may exclude from view, for our present purposes, the clear and brightly coloured varieties of corundum, so much prized as gem-stones (ruby, sapphire, &c.), and also the composite material known as emery. The latter substance should be regarded not as a mineral, but as a rock—one in which the mineral corundum is a predominant constituent, though always mixed with magnetite, tourmaline, and many other minerals.

Among the works of which the titles are given below, precedence may be fairly conceded to that which deals with Indian corundum. Corundum is a distinctively Indian mineral; its name is of Indian origin, and its recognition as a distinct mineral species was the result of the study of Indian specimens. The plan, now adopted by the Director of the Geological Survey of India, of republishing the "Manual of Economic Geology" in a series of separate memoirs, each dealing with a particular mineral, or group of minerals, is one which must commend itself to every one as being calculated to furnish us with the most complete and exact information from the pens of the best qualified authorities. It is fortunate that the writing of the memoir on corundum has fallen into the hands of so competent a mineralogist and geologist as Mr. Holland.

The first nine pages of the memoir are devoted to a condensed, but very clear and exact, account of the mineralogical characters of corundum. The next ten pages contain an admirable discussion of the geological relations of corundum. Mr. Holland's studies of the famous corundum-yielding rocks of Southern India have furnished him with much fresh material bearing on the mode of occurrence and association of the mineral. In the work before us only a brief sketch can be given of these, and of the theoretical questions upon which they throw much new light. It is to be hoped that the present short memoir will be followed by detailed accounts of the geology of Salem and other districts in Southern India, where Mr. Holland and several of his colleagues have had the opportunity of re-examining the rocks made known to us by the travels of Leschenault de la Tour, and the petrographical researches of Prof. Lacroix.

The larger portion of the memoir is occupied by detailed accounts of the exact distribution of corundum throughout the Indian Empire, and a discussion of the uses of corundum. In this latter part of the work much valuable information, carefully collected from a number of trustworthy sources, has been brought together; and the reader cannot fail to find much that is new, and also has important bearings on the economic uses and the manufacture of the various varieties of corundum as known in the markets of the world.

While the corundum of India has been sought for from the earliest times for use in grinding gems, and other purposes in which abrasive materials of the greatest hardness are required, the rich deposits of the same mineral in the Eastern United States have only been worked for similar purposes during the last twenty years.

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[1] "A Manual of the Geology of India.—Economic Geology." By the late Prof. V. Ball, C B., LL.D., F.R.S. Second edition revised in parts. Part I. Corundum. By T. H. Holland, A.R.C.S., F.G.S. (Calcutta, 1898.)

"Mineral Resources of the United States: Seventeenth Annual Report of the U.S. Geological Survey: Corundum Deposits of the Southern Appalachian Regions." By J. A. Holmes. (Washington, D.C., 1896.)

"Economic Geology of Eastern Ontario: Corundum and other Minerals." By Willet G. Miller. Report of the Bureau of Mines. Vol. vii. Pl. 3. (Toronto, 1898.)

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